

for a period of 11 weeks. The *Ohio*, *Cumberland* and *Tennessee* fell generally throughout the month at all stations.

Ice in Rivers and Harbors.—During the present month Duluth is the only station, within the limits of the Signal Service, reporting interruption of navigation by ice, and the following notes from this station are interesting: On the 1st, steamer *Quebec* made her way through eight miles of ice, which blocked the harbor, and was the first arrival of the season; on the 3rd, steamer *J. L. Hurd* started out, but became blocked in the ice about two miles from shore, and was unable to proceed until the 4th; on the 6th, several vessels were blocked in the ice while coming into port; on the 13th, vessels were still blocked, and the ice in some places was estimated to be forty feet deep, being backed up by strong NE. winds; on the 15th, some vessels succeeded in passing out, and on the 19th, the ice was driven out by strong westerly winds and the lake reported clear.

High Tides.—At Indianola on the 1st, 15th and 16th; on the latter date the water covered the streets, in some places to a depth of 18 inches. At Galveston, 15th, 16th, and 17th; on the 16th many streets were partly under water. At Pensacola, 24th, very high tide.

TEMPERATURE OF WATER.

The temperature of water as observed in rivers and harbors, with average depth at which observations were taken, is given in the table on the left-hand side of chart No. II. At the following stations observations were not made on the dates indicated: Duluth, 1st to 9th, hindered by ice; San Francisco, 1st to 17th, instrument broken.

ATMOSPHERIC ELECTRICITY.

Thunder-storms—were reported from the various districts on the following dates: New England, 3rd to 7th, 9th, 10th, 19th to 21st, 26th to 28th; Middle Atlantic States, 5th, 9th, 10th, 11th, 14th, 20th to 23rd, 26th, 27th, 28th; South Atlantic States, 4th, 11th, 12th, 22d, 23rd, 24th, 28th and 30th; Eastern Gulf States, 2d, 4th, 10th, 11th, 12th, 13th, 20th, 23rd, 24th to 27th, 29th, 30th, 31st; Western Gulf States, 1st, 2d, 4th, 5th, 12th to 16th, 18th, 19th, 20th, 23rd to 31st; Lower Lake region, 8th, 9th, 10th, 19th to 22d, 26th, 27th, 29th to 31st; Upper Lake region, 5th, 7th, 9th, 10th, 18th, 19th, 23rd, 24th, 31st; Ohio valley and Tennessee, 5th, 9th, 10th, 11th, 12th, 20th, 23rd, 24th, 27th, 29th, 31st; Upper Mississippi valley from 3rd to 31st; Lower Missouri valley, 3rd, 6th, 8th to 19th, 21st, 23rd to 31st; Eastern Rocky Mountain slope, 8th, 9th, 14th, 18th, 19th, 20th, 26th, 28th, 31st; Colorado, 19th and 28th; New Mexico, 28th; Utah, 26th; Wyoming, 3rd; Idaho, 15th; California, 12th at Princeton and Red Bluff; Washington Ter., 7th and 27th.

Auroras.—During May, 1880, three general auroral displays were observed over the United States, namely: on the 1st and 2nd, extending from Eastport, Me. to Montana; on the 14th, extending from New Hampshire and Massachusetts to Lake Superior, and from the 26th to the 28th, from New Hampshire to Montana. The most southerly stations reporting auroras were: Girard, Kans., New Corydon, Ind., and New London on the 1st; Woodstock, Md., on the 4th (very faint) and Cedar Vale, Kans., on the 7th. La Crosse, Wis., 1st, from 8:45 p. m. to midnight; color nearly white; in form of an arch, with lower edge well defined, with centre 10° above horizon. Below arch a dense haze, very dark in color and in striking contrast with the rest of the sky, which was very bright and clear. No beams or columns, merely a diffuse light, quite brilliant at times, nearly disappearing for a few seconds, and reappearing again. Arch extended from about 40° east to 30° west of magnetic meridian. Bismarck, 1st, 9:00 p. m., observed in northwest, extending upward about 30° . Duluth, 1st, 9 p. m., light grayish color, two arches, breaking up about 10 p. m. into beams of light, shooting upward to a great height, some of larger beams reaching to several degrees beyond the zenith. Aurora also observed at 10 p. m. of 2nd. Toledo, 1st, 10:50 p. m., shifting from E. to W. along the north horizon, many streamers reaching to zenith, disappeared at 11:30 p. m. Eastport, 1st, 8:20 p. m. to 2:45 a. m. of 2nd. Burlington, Vt., 2nd, 11:15 p. m. to 12:30 a. m., 3rd, green, dark segment, no arch of light or streamers. New London, 1st, 9 to 11 p. m. Bangor, Me., 2nd, 11:35 p. m. to midnight, very brilliant beams and daucers; altitude 45° ; azimuth 75° to 290° . Clear Creek, Neb., 1st, 8 p. m. to 11 p. m., from W. to NE. brightest in NW. Cresco, Ia., 1st, 9:15 p. m., bright low arch in NE. 10 p. m., a few straggling streamers; 10:30 p. m., disappeared; 2nd, 10:30 p. m., a few faint streamers starting from northern horizon. Gardiner, Me., 1st, 9 p. m. to midnight, very bright. 2nd, not very bright; obscured by clouds before midnight. Newburyport, Mass., 2nd, diffuse light above dark segment; a few streamers, no motion, disappeared at 10:20 p. m. Lima, N. Y., 1st, 9:50 to 10:50 p. m., faint, E. three to five streamers. St. Paul, 1st, 10 p. m., dark segment, with luminous arc; continuous motion from to W.; color, pale yellow and orange; remained visible about 40 minutes; telegraph wires perceptibly affected. Pembina, 1st, appeared at 8:30 p. m., and continued throughout night; no continuous arch except for a minute or two, and dark segment scarcely visible. The aurora extended from about 160° to 280° azimuth, with an altitude at various times reaching to the zenith; colors, crimson, yellow and green, very transparent. Breckenridge, 1st, 8 to 10:40 p. m., light green color tinged with red. Burlington, Vt., 14th, from 9 p. m. to 12:30 a. m. of the 15th, light arch of light, pale green. Auburn, N. H., from 9:20 p. m., of 14th, to early morn of 15th. Toledo, 26th, 8:50 p. m., altitude of streamers, 30° to 90° ; no lateral motion; disappeared at 11 p. m. Oswego, 26th, 9:15 to 9:50 p. m., NE. to NW.; altitude to zenith; dark segment sur-